

**R E M A R K S**

Reconsideration of this application, as amended, is respectfully requested.

**RE: INFORMATION DISCLOSURE STATEMENT**

Copies of the references cited in the Information Disclosure Statement filed on October 6, 2004 (which were apparently not forwarded to the USPTO by WIPO), are submitted herewith. Also submitted herewith is a copy of the form PTO/SB/08A submitted with the IDS filed on October 6, 2004. It is respectfully requested that the Examiner return an initialed copy of the form PTO/SB/08A to confirm that the publications listed thereon have been considered and made of record.

It is respectfully submitted that no fee should be required. Nevertheless, authorization is hereby given to charge any necessary fee to Account No. 06-1378.

**RE: THE DRAWINGS**

Figs. 4B, 8A, 8B, 14 and 15 have been amended to be labeled as "PRIOR ART", as required by the Examiner.

The drawings were also objected to as failing to show a plane "vertical" to the rotation axis of the centrifugal rotor as recited in the claims. The claims have been amended to replace the term "vertical" with "perpendicular". And it is respectfully

submitted that the drawings clearly show the structural features recited in the claims whereby at least one centrifugal blasting machine is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is: at an angle in a range from 0 to 45° with respect to a direction of travel of the metallic sheet (e.g., claim 1), or at an angle in a range from 5 to 45° with respect to a direction of travel of the metallic sheet (e.g., claims 2 and 14), or parallel to a direction of travel of the metallic sheet (e.g., claim 3), or at an angle in a range from 5 to 30° with respect to a direction of travel of the metallic sheet (e.g., claims 10 and 15). See, for example, Figs. 1 and 3.

No new matter has been added, and it is respectfully requested that the amendments to the drawings be approved and entered, and that the objections to the drawings be withdrawn.

RE: THE SPECIFICATION

The specification has been amended to correct the informality pointed out by the Examiner on page 3 of the Office Action.

The specification has also been amended at the first occurrence of the phrase "vertical to" (page 4, line 11) to clarify that "vertical to" means "perpendicular to". This

amendment is fully supported by the disclosure throughout the original specification, drawings and claims.

Still further, the specification has been amended to make a few minor grammatical improvements.

No new matter has been added, and it is respectfully requested that the amendments to the specification be approved and entered, and that the objection to the specification be withdrawn.

#### THE CLAIMS

Independent claim 1 has been amended to clarify that the at least one centrifugal blasting machine is stationary, as supported by the disclosure throughout the specification and drawings.

Method claim 7 has been amended to be rewritten in independent form based on amended claim 1, to put claim 7 in proper U.S. form.

New claim 10 has been added to recite the more preferred range of 5° to 30° for the angle between the direction of travel of the metallic sheet and the line of intersection of the plane perpendicular to the rotation axis with the plane of the metallic sheet, as supported by the disclosure in the specification at, for example, page 37, lines 9 and 10.

New claims 11 and 12 have been prepared based on claims 3 and 2, respectively, depending from claim 5. See also Fig. 3 with respect to claim 11 and Fig. 1 with respect to claim 12.

New claim 13, which depends from claim 1, and new claim 14 depending from claim 13, have been prepared based on the structure shown, for example, in Figs. 2 and 3 and described in the specification at, for example, page 23, line 20 to page 25, line 3. See also, for example, "EXAMPLE 2".

New independent claim 15 has been prepared to recite the subject matter of claim 2 in independent form (based on the original subject matter of its parent claim 1).

New claim 16, which depends from new independent claim 15, recites subject matter corresponding to new claim 10.

New claim 17, which depends from new independent claim 15, recites that the at least one centrifugal blasting machine is stationary, as recited in amended independent claim 1.

New claim 18, which depends from new independent claim 15, has been prepared based on claim 5.

New claim 19, which depends from new independent claim 15, and new claim 20 depending from claim 19, have been prepared to recite the structure shown, for example, in Fig. 1 and described in the specification at, for example, page 22, line 6 to page 23, line 19. See also, for example, "EXAMPLE 1".

The claims have also been amended to make some clarifying amendments, including corrections of some minor grammatical improvements and antecedent basis problems, so as to put the claims in better form for issuance in a U.S. patent. In particular, the amended and new claims use the phrase "perpendicular to" in place of the phrase "vertical to". And it is respectfully submitted that it is clear from the disclosure in the original specification, claims and drawings that "perpendicular to" is the intended meaning of "vertical to".

No new matter has been added, and it is respectfully requested that the amendments to the claims be approved and entered.

It is respectfully submitted, moreover, that the amended and new claims clearly and definitely recite the features of the present invention and are fully supported by the disclosure in the specification, and it is respectfully requested that the rejections under 35 USC 112 be withdrawn.

#### THE PRIOR ART REJECTION

Claims 1, 2 and 7-9 were rejected under 35 USC 103 as being obvious in view of the combination of USP 3,705,510 ("Baughman") and USP 6,651,299 ("Mitsubayashi et al"), and claims 1, 3 and 7 were rejected under 35 USC 103 as being obvious in view of the combination of USP 6,584,820 ("Benedict et al") and the

applicant's admitted prior art as described in the specification. These rejections, however, are respectfully traversed.

As recognized by the Examiner, Baughman discloses projecting metal shot from centrifugal shot throwing wheels to a metal object. Figs. 4 and 5 of Baughman show a configuration in which the shot throwing wheels 36 are aligned such that the rotating axes thereof extend along a moving direction of the metal sheet 66. Thus, the plane perpendicular to the rotating axes of the shot throwing wheels 36 of Baughman intersects the metal sheet 66 at an intersecting line that is perpendicular to the moving direction of the metal sheet 66. With this arrangement, Baughman discloses that oscillation of the shot throwing wheels is not necessary. See Fig. 4 of Baughman.

Baughman also discloses that the orientation of the shot throwing wheels may be changed by 90° as shown in Fig. 7. With this structure, as shown in Fig. 6 of Baughman, the plane perpendicular to the rotating axes of the shot throwing wheels 36 of Baughman intersects a plane of the longitudinal stringers 72 at an intersecting line that is parallel to the moving direction of the longitudinal stringers. However, this embodiment of Baughman requires oscillation of the shot throwing wheels 36 during movement of the longitudinal stringers 72 as shown in Figs. 8-11 and disclosed at column 5, line 35 to column 7, line 30 of Baughman.

Thus, while Baughman discloses shot throwing wheels 36, Baughman merely discloses stationary wheels in the orientation of Figs. 4 and 5 thereof (in which the plane perpendicular to the rotating axes of the shot throwing wheels 36 of Baughman intersects the metal sheet 66 at an intersecting line that is perpendicular to the moving direction of the metal sheet 66). And Baughman discloses an orientation as shown in Figs. 6 and 7 thereof in which the plane perpendicular to the rotating axes of the shot throwing wheels 36 intersects a plane of the longitudinal stringers 72 at an intersecting line that is parallel to the moving direction of the longitudinal stringers, but in which the shot throwing wheels 36 require oscillation.

By contrast, according to the present invention as recited in amended independent claim 1, the at least one centrifugal blasting machine comprises a centrifugal rotor having a rotation axis, and the at least one centrifugal blasting machine is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 0° to 45° with respect to a direction of travel of the metallic sheet. And according to the present invention as recited in amended independent claim 1, the at least one centrifugal blasting machine is stationary.

It is respectfully submitted that Baughman clearly does not disclose, teach or suggest at least one centrifugal blasting

machine which is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 0° to 45° with respect to a direction of travel of the metallic sheet and which is stationary as recited in amended independent claim 1.

Similarly, with respect to amended independent method claim 7, it is respectfully submitted that Baughman clearly does not disclose, teach or suggest applying surface treatment to a continuously traveling metallic sheet by blasting solid particles having a mean particle diameter of 30 to 300  $\mu\text{m}$  against the metallic sheet using at least one centrifugal blasting machine which comprises a centrifugal rotor having a rotation axis, and which is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 0 to 45° with respect to a direction of travel of the metallic sheet, wherein the at least one centrifugal blasting machine is not moved while applying the surface treatment.

Still further, new independent claim 15 (which does not require that the at least one centrifugal blasting machine is stationary) recites that the at least one centrifugal blasting machine is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 5° to 45° with respect to a



direction of travel of the metallic sheet as recited in new independent claim 15. It is respectfully submitted that while Baughman discloses the perpendicular orientation in Figs. 4-5 thereof and the parallel orientation in Figs. 6-7 thereof, Baughman clearly does not disclose, teach or suggest at least one centrifugal blasting machine which is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 5° to 45° with respect to a direction of travel of the metallic sheet as recited in new independent claim 15 (and amended dependent claim 2).

It is respectfully pointed out that the features of the present invention as recited in amended independent claims 1 and 7 and new independent claim 15 are directed to solving a particular problem which occurs when a centrifugal blasting machine is used to blast solid particles having a mean particle diameter of less than 300  $\mu\text{m}$ . That is, the claimed present invention is directed to solving a problem that occurs whereby when an increased quantity of solid particles is blasted to a specified blast range (which is necessary when the line speed at which the sheet is traveling is increased) the particles collide with each other. When the particles collide with each other, the number of particles colliding against the sheet is reduced, or the speed of particles colliding against the sheet is reduced to

a level ineffective for forming a sufficient number of dents on the sheet. (See Fig. 7 and the Background of the Invention section of the specification.)

To avoid this problem (see the comparative examples described in the Detailed Description), according to the claimed present invention the at least one centrifugal blasting machine is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 0° to 45° with respect to a direction of travel of the metallic sheet.

By contrast, Baughman discloses an apparatus in which the shot throwing wheels can throw shots at a diameter of up to 1/4 inch (i.e., 6,350  $\mu\text{m}$ ). Accordingly, it is respectfully submitted that Baughman does not relate to the problem confronted by the present invention or the structure of the claimed present invention whereby a centrifugal blasting machine is provided for blasting solid particles having a mean particle diameter of 30 to 300  $\mu\text{m}$  against a continuously traveling metallic sheet.

Indeed, the Examiner has acknowledged on page 5 of the Office Action that Baughman does not disclose blasting solid particles having a mean particle diameter of 30 to 300  $\mu\text{m}$ . For this reason, the Examiner has cited Mitsubayashi et al to supply the missing teachings of Baughman.

It is respectfully pointed out, however, that while Mitsubayashi et al discloses performing shot peening using particles having a diameter of 70  $\mu\text{m}$ , Mitsubayashi et al discloses this structure in relation to improving the fatigue strength of an endless metal belt having a thickness of, for example, 0.2 mm.

By contrast, Baughman is related to processing metal sheets for use in aircraft. And it is respectfully submitted that one of ordinary skill in the art using the invention disclosed by Baughman to process metal sheets for an aircraft would have no motivation to turn to Mitsubayashi et al (which relates to improving the fatigue strength of a thin endless metal belt) for teachings relating to the particles used in Baughman.

In addition, it is respectfully pointed out that Mitsubayashi et al relates to an air blasting machine, which is a machine that accelerates compressed air at an ejection nozzle and accelerates solid particles using the drag of the compressed air. By contrast, Baughman discloses a centrifugal blasting machine, which blasts solid particles using the centrifugal force of a rotating vane. It is respectfully submitted that, while Mitsubayashi et al discloses shot particles having a diameter of 70 $\mu\text{m}$  in connection with an air blasting machine (in which blasting particles having a mean particle diameter of 30 to 300  $\mu\text{m}$  is known), it is not reasonable to combine the disclosure

of Mitsubayashi et al relating to an air blasting machine with the disclosure of Baughman relating to a centrifugal blasting machine. And it is respectfully pointed out that the at least one blasting machine recited in amended independent claims 1 and 7 and new independent claim 15 is a centrifugal blasting machine, in contrast to the air blasting machine disclosed by Mitsubayashi et al.

In any event, it is respectfully submitted that even if Mitsubayashi et al were combinable with Baughman as suggested by the Examiner, the features of the present invention as recited in amended independent claims 1 and 7 and the features of the invention as recited in new independent claim 15, as described hereinabove, would still not be achieved or rendered obvious.

The Examiner has also cited the combination of Benedict et al and the admitted prior art as disclosing the features of the present invention as recited in claims 1, 3 and 7.

It is respectfully pointed out, however, that as acknowledged by the Examiner Benedict et al does not disclose a centrifugal blasting machine. Accordingly, Benedict cannot possibly disclose an orientation of a rotation axis of a centrifugal blasting machine in the manner recited in amended independent claims 1 and 7 and in new independent claim 15. In addition, the admitted prior art as described in the specification also does not disclose, teach or suggest the claimed orientation of the centrifugal blasting machine

as recited in amended independent claims 1 and 7 and new independent claim 15.

It is respectfully pointed out, moreover, that the drawings of Benedict et al show blasting particles in a blasting range having a long axis perpendicular (i.e., at an angle that appears to be 90°) to the traveling direction of the metal plate.

Accordingly, it is respectfully submitted that the combination of Benedict et al with the admitted prior art clearly does not disclose, teach or suggest at least one centrifugal blasting machine which comprises a centrifugal rotor having a rotation axis, and which is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 0° to 45° with respect to a direction of travel of the metallic sheet, or at least one centrifugal blasting machine which comprises a centrifugal rotor having a rotation axis, and which is positioned such that a line of intersection of a plane perpendicular to the rotation axis with a plane of the metallic sheet is at an angle in a range from 5° to 45° with respect to a direction of travel of the metallic sheet. Accordingly, it is respectfully submitted that the combination of Benedict et al with the admitted prior art clearly does not disclose, teach or suggest the features of the present invention as recited in any of independent claims 1, 7 and 15.

In view of the foregoing, it is respectfully submitted that the present invention as recited in amended independent claims 1 and 7 and new independent claim 15, as well as amended claims 2-6 and 8-14 depending from claim 1 and new claims 16-20 depending from claim 15, clearly patentably distinguishes over Baughman, Mitsubayashi et al, Benedict et al and the admitted prior art, taken in any combination under 35 USC 103.

Re: Claims 4-6

It is noted that the Examiner has not rejected claims 4-6 based on the prior art.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned for prompt action.

Respectfully submitted,

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